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EDITORIAL

THE SEEDING OF WORLDS

As a sort of initiation stunt precedent to admission into the fraternity of agencies of good and regular standing, every new agent that is brought into view by the ongoings of science is likely to be set to the task of solving some large part of the outstanding puzzles that still vex the wise men of our craft. "Light pressure" is one of the latest novitiates on trial, and has been set to the stunt of seeding the habitable but not inhabited worlds by spores from some previous spore-growing world. The seeding of the first world is mercifully not made a part of the stunt. So too, to help out the novice somewhat, the hazards of the cold of space are mitigated by bringing to bear certain novel tenets about endurance of extreme cold, and by cutting the time by the great speed of the trip from world to world under the new pressure. The stunt still remains a stiff one and is interesting, but the fraternity seems to be missing the best part, the getting home to the new world; no doubt because it is so far off.

The start of the spore from the spore-growing planet is not without its little difficulties; for the seed, be it even so light as the airy fluff of the puffball, must yet not only get out to the very top of the air, but it must be pushed off by the pressure of the light at a speed of some 5 or 6 miles a second to be able to get away from the pull of the parent world, if that world be a body like our familiar acquaintance, the earth. A Krakatoan blast, however, can no doubt give the spore a lift, if need be. But the getting away is not the interesting part of the stunt; it is the landing.

If "light pressure" has once pushed the spore out of the clutches of the parent world and got it well under way, all is likely to go well till the bounds of the sun's sphere of control are reached and the border of the domain of the other sun is entered, for that sun is likely to push back as much as the parent sun pushed out. In matters of this sort one sun seems unwilling to be the dumping-

ground of another sun. So now, between the opposing pushes of the rival suns, comes the real trial of skill or luck in landing the spore. If the seed be duly planted, the fraternity door should surely open for the candidate *magna cum laude*.

On leaving the domain of the old sun and entering the field of new suns, care or luck in hitting on a sun that shines less bright than the one that has pushed the spore out is surely needed, or else the back-push of the brighter sun will grow in time to be stronger than the on-push of the old sun and the spore will be stopped or turned aside. If someone churlishly remarks that the seeding of new worlds can thus only go down the scale of solar radiance, let that pass; it is enough to seed at long distance any world.

Hitting upon a sun of duly lesser radiance, the spore must shoot straight for it, quite straight, center to center, for if the backward push of the sun ahead is a little awry at the front, the spore will be pushed aside and out of line, and once off the line it will be turned more and more away and surely go astray. Nor must the chosen sun move out of line while the spore is coming toward it, or else the front push will surely turn the spore away. No sun must be hit upon but one that will stand still, if such there be, while the spore is getting home to the new planet, or, if no sun stands still, a sun must be hit upon that is coming toward or else is going straight away from the advancing seed.

All ill luck in hitting the right path or in hitting on a sun moving straight toward or straight away from the speeding spore once duly escaped, the larger perils are past, but not all; there are perils of side pushes. In hitting upon a star of proper weakness of radiance and coming or going or standing still duly, the spore may chance to pass some brighter star off the line and its side push may turn the spore off its course; or stars may be thicker or brighter on one side or another and the spore be put off its course by their united pushes. Where, then, it may again be churlishly asked, is a spore to go if all the suns push it away? Well, it is not a part of this stunt to chase up lost spores; still, there are "dark lanes" and "coal sacs" and "openings" leading out into room "outside the universe."

Then too there are perils of planets as well as perils of suns.

As the spore pushes down against the radiance of the defendant sun, one of whose planets, near enough to it to keep duly warm, is to be seeded for a new life kingdom, a planet just at the right spot must be hit upon. Luck must here stand the spore in good stead, for the chances are not the best. If the planets of the chosen sun circle round it cross-ways, in any but the minutest degree, they will never be in the center-to-center line of the spore's path, for, as we have seen, the spore must keep true to line or the backward push of the light pressure in front, striking aslant, will turn the spore off. There is a chance indeed that a spore will get down to just the right point and then be turned off just so as to strike a planet that is off line, but it is not a chance to stake much on. To have any fair chance of getting home to a planet while the spore keeps straight on toward the repellent sun, under the superior inertia it got from the sun it left, the planet must circle round the sun in a path that cuts this line.

And then, too, the planet must be there at just the right time. The spore must no doubt cross the spot in the wink of an eye, or less, and the new world must be there on exact time if it is to be seeded. It is not unfair that it should be made to be there on time as its part of the stunt, for the spore has come far to do its part.

Now if all has gone well thus far there is only the landing left. If the spore was pushed out from the old sun too fast, it may plunge so swiftly into the air of the new world as to strike fire and burn or brown itself fatally. But if pushed out just right at the start and pushed back just right on the road, it may land with little more than the speed forced by the pull of the new earth, a matter of a few miles a second, it may be.

When the speed of the spore is stopped and it floats in the outer air of the new earth it may perchance from being too hot come quickly to be too cold and the change from warmth to chill may try its salamandrine powers before it sinks to the warm air low down or to the ground in which it is to grow.

The luck of the spore must stay by it a little farther in its lighting. All may be lost if it falls on polar snow, or mountain peak, or desert plain, or perchance in the ocean midst, if it is not

a salt-water spore. It must fall in a spot where it can grow, where its family, as it comes to have one, may live and multiply and grow into a kingdom, for if it fails in this last, the kingdom will not be won.

The stunt may be perilous; but it is easy to see how easy it is to do if done just right. Light is the great foster-farmer of the earth, the truly great farmer; and we now see how clearly and truly "light pressure" is the long-distance seed-planter of the worlds.

T. C. C.

ARTESIAN WATERS OF ARGENTINA

The climate of a part of Argentina is semi-arid, and the geological formations which are regarded as Quaternary and Later Tertiary are, in the western and central districts of the country, saline to a degree which indicates prolonged duration of aridity. The region of the Pampas which covers the province of Buenos Aires and stretches northward west of the Parana does not exhibit this characteristic, having apparently long enjoyed a more humid climate, as it does now. The foothills of the Andes are also well watered. But with the exception of these last-named regions, a great part of the country suffers from lack of good water. This condition may, however, be in some measure relieved by proper development of artesian supplies. Many wells have been sunk already, but without adequate geological investigation. In the Pampas, water is found at a general depth of 20 meters more or less, and is pumped to the surface by windmills. It may be said that the development of the livestock industry of Argentina would be impossible were it not for this supply which comes from eolian, alluvial deposits of Quaternary and Tertiary age. A different geological condition exists from the Rio Colorado southward in what may be best described as northern Patagonia. In that region there are local elevations occupying a middle position between the Atlantic and Pacific, composed of granites and older rocks possibly of Paleozoic age, and rising to altitudes of 300 to 1,000 meters. These mountains are not represented upon any map and their distribution is not known, but they have been described by Moreno and other explorers. Upon their flanks there